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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:
Akihiko YAGASAKI et al.

Art Unit: 2832

Appl. No. 09/597,236

Examiner: Tuyen T. Nguyen

Filed: June 20, 2000

Atty. Docket No. 37174-164287

For: ISOLATION TRANSFORMERS

Customer No.

26694
PATENT TRADEMARK OFFICE

APPEAL BRIEF

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This is an appeal from the final Office Action dated August 28, 2002.

I. Real Party In Interest

The real party in interest, by virtue of an assignment recorded at reel 10887, beginning at frame 0410, is Denkenseiki Re. In. Corp. of Tokyo, Japan.

II. Related Appeals And Interferences

There are no related appeals or interferences.

III. Status Of Claims

Claims 18-27 stand finally rejected. Claims 1-17 have been cancelled. No claims have been allowed. The final rejection of claims 18-27 is appealed.

IV. Status Of Amendments

An amendment making minor corrections to the specification after the final rejection was filed on November 25, 2002. In an Advisory Action mailed on December 13, 2002, the Examiner indicated that the amendment will be entered for purposes of appeal.

V. Summary Of The Invention

The present invention relates to isolation transformers that suppress high-frequency electromagnetic noise transmitted through power transmission lines and/or signal transmission lines (page 3 of the original specification, paragraph 1). The isolation transformer has: a multi-layer, multi-winding primary coil fabricated by stacking coil layers formed by winding an insulated, covered, copper wire; a secondary coil having the same characteristics as the primary coil; a core that forms a magnetic path between the primary coil and the secondary coil; and a plurality of short-circuit rings made of conducting thin film sandwiched between the coil layers of at least one of the primary and secondary coils (page 10, paragraph 16). The insulated, covered, copper wire 5 has an insulated cover 5b over a copper wire 5a (Fig. 2 and page 13, paragraph 20). In the primary coil of the embodiment of Fig. 1, the wire 5 is wound with many layers and many windings. Likewise, the secondary coil 2 has many layers and many windings (Fig. 1 and page 13, paragraph 20). Adjacent layers of windings are separated by short-circuit rings 4 of conducting thin film (page 14, paragraphs 22, 23).

A short-circuit ring 4 can be positioned in each inter-coil-layer space as shown in Fig. 1 (page 18, paragraph 30). As an alternative, a short-circuit ring 4 can be positioned

in each of selected inter-coil-layer spaces (Fig. 3 and page 18, paragraph 31). As another alternative, the isolation transformer of the present invention can have cylindrically-wound, cylindrical-coil layers instead of planar, spiral coil layers. In the cylindrical-layer embodiment, short-circuit rings 4 can be inserted into each inter-coil-layer space or between selected coil layers (Fig. 4; page 19, paragraph 32 and original claim 5 as it depended on claim 3).

VI. Issue

The issue is whether the Examiner erred in rejecting claims 18-27 under 35 U.S.C. §103 as being unpatentable over McLoughlin in view of Lungu.

VII. Grouping Of Claims

Claim 24 stands or falls with claim 18. None of the other claims stand or fall together. It is requested that the patentability of each of the other claims be determined individually. Arguments describing the additional distinctions of all of the claims, other than claim 24, are presented in the next section.

VIII. Argument

During an interview, the Examiner pointed out that the structure of the coil of the Lungu reference is like the structure of the coils of Figs. 7 and 8 of the present application.

The Examiner is correct that Lungu does disclose a wire having a core conductor 1, a dielectric insulation 2 surrounding the core conductor and a thin metalization layer 3 on the dielectric insulation 2, the wire being formed into a coil.

However, there are important differences between the Lungu device on the one hand and independent claim 18 and the embodiment of Figs. 7 and 8 of the present

application on the other hand. Specifically, Fig. 7 of the present application shows two coils 1 and 2, each comprising multi-layers and multi-windings of an insulated, covered wire, the coils together comprising an isolation transformer. Claim 18 calls for two coils, a primary coil and a secondary coil, each having multi-layers and multi-windings of an insulated, covered wire. Claim 18 also calls for a plurality of short-circuit rings made of conducting thin film sandwiched between the layers of at least one of the coils.

Lungu does not disclose nor suggest the two coils of Figs. 7 and 8, or the two coils of claim 18, which covers the embodiment of Figs. 7 and 8 and the other embodiments. In Lungu, only a single wire formed into a coil is used. Where Lungu suggests using his coil as a transformer, he does not suggest using two coils each formed by winding an insulated, covered wire. Instead, as can be seen from column 14, line 50 - column 15, line 23 and Figs. 14 and 15 of Lungu, the transformers of Lungu use the core 1 of the wire as a first coil and the thin film exterior metalization 3 as the second coil. The thin film metalization 3 does not satisfy the requirement of claim 18 of a multi-layer, multi-winding coil formed by winding an insulated, covered wire. The thin film metalization 3 is not insulated nor covered.

The appellant is mindful that claim 18 was not rejected as under 35 USC 102 as being anticipated by Lungu but rather under 35 USC 103 on the basis of McLoughlin in view of Lungu. In that regard, it would not have been obvious to modify McLoughlin in view of Lungu in the manner proposed by the Examiner in the final rejection.

There is nothing in the references that suggests they be combined. According to *In re Fine*, 5 USPQ2d 1596,1600 (Fed. Cir. 1988), "teachings of references can be combined only if there is some suggestion or incentive to do so" (emphasis by the court).

The fact that disclosures of references can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination (*In re Imperato*, 179 USPQ 730 (CCPA 1973)). In the present situation, the prior art does not contain anything to suggest the desirability of the combination. McLoughlin does not suggest the desirability of using coils like those of Lungu rather than ordinary coils, and Lungu does not suggest the use of two of its coils in the device of McLoughlin. McLoughlin uses a primary winding 24 and a secondary winding 26, with a metallic shield 28 between them. As was stated above, Lungu teaches that, when its coil is used as a transformer, the core 1 constitutes a first winding and the thin metalization layer 3 on the outside of the insulation 2 constitutes a second winding. Thus, Lungu actually teaches away from the use of its coils in an arrangement like that of McLoughlin, two distinct windings with a metallic shield in between, thereby rendering the combination unobvious.

Furthermore, as is described in the present application, the present invention provides an isolation transformer with high noise attenuation rates, as well as high reliability by sufficiently suppressing the amplitude of noise attenuation characteristic curves (page 10, paragraph 15). Neither of the references addressed this problem or attempted to solve it. According to *In re Shaffer*, 108 USPQ 326 (CCPA 1956), one having references before him who was not cognizant of the applicant's disclosure would not be informed that the problem solved by the applicant ever existed. The court added that references which never recognized the applicant's problem can not have suggested its solution and that, therefore, the references were improperly combined since there is no suggestion in either of them that they can be combined to produce the applicant's result.

In view of the foregoing, it is believed to be clear that the combination of references used in finally rejecting claim 18 of the present application would not have been obvious and that, therefore, claim 18 is patentable.

Consideration of the following additional differences between the isolation transformer of the present invention and the prior art is respectfully requested.

The device to which the claimed invention of Lungu is applied is not an isolation transformer capable of cutting off high frequency noises, but an electric component with inductive and capacitive properties.

It seems that the Examiner compares the coil 4 having multi-layers and multi-windings shown in Fig. 1 and Fig. 2 of the Lungu without, as Lungu describes it, the "arbitrary cross-section I" to the coil (column 4, lines 35-50) with a primary coil having multi-layers and multi-windings, a secondary coil with multi-layers and multi-windings, and a core, and the latter is only a coil with multi-layers and multi-windings shown in Figs. 7 and 8 of the present invention. However, the coil 4 with multi-layers and multi-windings shown in Fig. 1 and Fig. 2 of the Lungu without the "arbitrary cross-section I" is a defective part as an electric component with inductive and capacitive properties. That is, when the wire WD is wound into a coil, the thin film metalization layer 3 of the Lungu reference does not comprise the plurality of short circuit rings made of conducting thin films sandwiched between the coil layers as is called for by claim 18. The reason is that the arbitrary cross-section I is formed on the coil 4 by "burning out" the metalization 3, in order to prevent short-circuit currents from flowing on the surface of the conducting thin films sandwiched between the coil layers, as shown in Fig. 2 and Fig. 3 and described in column 4, lines 35-50. The arbitrary cross-section I on the coil 4 or the

"burning-out" of the metalization 3 is an essential feature of the patented invention of Lungu, in order to obtain an electric component with inductive and capacitive properties.

There is neither a description nor a suggestion in the Lungu reference that the wire WD is wound into a coil so as to comprise the plurality of short circuit rings made of conducting thin films sandwiched between the coil layers, or that the coil with the plurality of short circuit rings is useful for composing an isolation transformer capable for cutting off high frequency noises.

Each of the prior art references cited by the Examiner simply shows how to prevent the effect of "short-circuit currents". In addition, the present invention has been achieved by using "short-circuit currents" intensively.

Dr. Akihiko Yagasaki, the pioneer of noise isolation transformers or noise cutoff transformers and the present inventor, has changed the negative effects into positive ones with regard to "short-circuit currents" in the high frequency band. Last year, Waseda University, one of the highest ranking universities in Japan, granted him a doctor's degree based upon his prominent research on noise isolation transformers. The report "Highly Improved Performance of a Noise Isolation Transformer by a Thin-Film Short-Circuit Ring", IEEE TRANSACTION ELECTROMAGNETIC COMPATIBILITY Vol. 41 No. 3, August 1999, is said to be one of the leading and valuable reports on noise isolation transformers.

The present invention has only been made by the inventor, based on his original conception to use "short-circuit currents" effectively.

It is clear now that the embodiments of Figs. 7 and 8 of the present invention greatly differ from the coil 4 with multi-layers and multi-windings shown in Fig. 1 and

Fig. 2 of the Lungu without the "arbitrary cross-section I", because the former is an isolation transformer comprising a primary coil with multi-layers and multi-windings, a secondary coil with multi-layers and multi-windings and a core, and the latter is only a coil with multi-layers and multi-windings.

And there is neither a description nor a suggestion on how to use the coil 4 with multi-layers and multi-windings shown in Fig. 1 and Fig. 2 of the Lungu without the "arbitrary cross-section I", except for the description in which it is used as a part of an electric component with inductive and capacitive properties.

The present invention is related to isolation transformers that suppress high frequency electromagnetic noise. For example, reading claim 18 on the embodiment of the invention depicted in Fig. 1, the isolation transformer comprises a multi-layer, multi-winding primary coil 1, fabricated by stacking coil layers 11-15 formed by winding an insulated, covered copper wire and a multi-layer, multi-winding secondary coil 2 fabricated by stacking coil layers 21-25 formed by winding an insulated, covered copper wire. A core forms a magnetic path between the primary coil 1 and the secondary coil 2. A plurality of short-circuit rings 4, made of conducting thin films, are sandwiched between the coil layers 11-15 and 21-25 of at least one of the primary and secondary coils 1, 2. This structure provides an isolation transformer with high noise attenuation rates, as well as high reliability by sufficiently suppressing the amplitude of noise attenuation characteristic curves.

McLoughlin and Lungu do not render the present invention obvious, because they do not teach or suggest, among other things, short circuit rings sandwiched between the coil layers of at least one of the primary coil and the secondary coil.

McLoughlin discloses an isolation transformer 22 comprising a primary winding 24, a secondary winding 26, and a metallic shield 28 (column 4, lines 20-24). The metallic shield 28 is placed between the primary winding 24 and the secondary winding 26. The metallic shield 28 intercepts any possible electrostatic field line between any point on the primary winding 24 and any point on the secondary winding 26 (column 5, lines 40-48). The isolation transformer places a metallic shield between a primary and secondary winding of the transformer and grounds the shield. Common mode interference current then flows through the primary winding to shield capacitance to ground, providing isolation for the secondary winding and its load from the common mode interference on the primary winding (column 1, lines 39-45). Accordingly, it is clear that the metallic shield 28 described in McLoughlin forms a connection between the primary winding 24 and the second winding 26 (Figs. 5 and 6), and is not sandwiched between the coil layers of at least one of the primary coil and the secondary coil, as recited in claim 18.

Moreover, the metallic shield 28 of McLoughlin is not a short circuit ring. The metallic shield 28 comprises two overlapping members insulated from each other so as to not create a "shorted turn" around a portion of the core (column 6, lines 1-3). Fig. 11 of McLoughlin illustrates a conventional L-shaped member 76 composing the metallic shield 28 (column 6, lines 13-14). Fig. 12 shows an alternative implementation using two U-shaped members 82 comprising the metallic shield 28 (column 6, lines 19-21). Accordingly, McLoughlin teaches that the metallic shield 28 is not a conductive short circuit means as recited in the present claims, but is a non-shorted turns means.

Lungu does not supplement McLoughlin to teach or suggest the features recited in the present claims that are missing from McLoughlin. Lungu describes an electric component with inductive and capacitive properties. A wire includes a core conductor 1 carrying a uniform and continuous concentric insulation layer 2 (column 3, lines 22-25). A uniform metalization layer being as thin as possible, preferably a thin film, is deposited on the dielectric insulation 2 as an external conductor 3 (column 3, lines 31-34). The conductivity of the coil conductor 1 is much higher than the conductivity of the external conductor of the metalization 3, respectively (column 3, lines 37-39). It is the purpose of such a construction to reduce short circuited turn effects to a minimum in view of the fact that, in a conventional winding process, the external metalization 3 of adjacent turns and winding layers touching one another represents closed short circuited turns (column 3, lines 40-45).

The same winding potential U_w is created in the metalization 3 being electrically closed to form a circuit of the winding wire. This also may lead to disadvantageous short circuit currents (column 4, lines 30-33). The short circuit currents may be kept low by the metalization 3 applied in a thin layer, so that the effect thereof may be neglected. In the case of higher frequencies, the metalization 3 should be interrupted at a cross-section I of the coil 4, thus canceling the short circuit effect. To achieve this, the metalization is locally removed by electric discharging (column 4, lines 40-42). Accordingly, the thin film deposited on the dielectric insulation 2 as an external conductor 3 in Lungu is taught to prevent the short circuit winding effect. In comparison, independent claim 18 recites that the isolation transformer includes short circuit rings. Independent claim 27 recites that at least one short circuit ring is formed by coating a copper wire.

As Lungu describes a wire which is used to cancel a short circuit effect, it teaches away from the present claims. Please see In re Haruna, 249 F.3d 1327, 58 USPQ2d 1517 (Fed. Cir. 2001), "A prima facie case of obviousness can be rebutted if the applicant . . . can show 'that the art in any material respect taught away' from the claimed invention," In re Geisler 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (quoting In re Malagari, 499 F.2d 1297, 1303, 182 (USPQ 549, 553 (CCPA 1974)). 'A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant.' Tec Air, Inc. v. Denso Mfg. Mich. Inc., 192 F.3d 1353, 1360, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999)."

Independent claim 27 is also directed to an isolation transformer and calls for a multi-layer, multi-winding primary coil and a multi-layer multi-winding secondary coil, each fabricated by stacking coil layers formed by winding an insulated, covered copper wire. Thus, it is submitted that claim 27 is patentable over the combination of McLoughlin and Lungu for the reasons presented above in connection with claim 18.

Since claims 19-26 depend on claim 18, it is submitted that they are allowable with it.

In addition, claim 19 calls for the short-circuit rings to be sandwiched between each of the coil layers. The combination of McLoughlin and Lungu proposed by the Examiner does not have short-circuit rings sandwiched between each of the coil layers.

Claim 20 depends on claim 18 and calls for the short-circuit rings to be sandwiched between selected coil layers. Such sandwiched short-circuit rings are missing from the proposed combination of McLoughlin and Lungu.

Claim 21 depends on claim 18, and further requires that the coil layers of the primary and secondary coils are sheet-type coil layers. Such layers are disclosed, for example, in Figs. 1 and 3 and page 18, paragraph 31. McLoughlin and Lungu fail to disclose such sheet-type coil layers (column 4, lines 51-56). In Lungu, the coil 3 is formed around a shaft 7 of a winding machine, which does not appear to be capable of winding the wire into sheet-type coil layers, and sheet-type, or flat spiral, layers are not suggested by Lungu.

Claims 22 and 23 depend on claim 21, which depends on claim 18. Claim 22 calls for the short-circuit rings to be sandwiched between each of the coil layers and claim 23 calls for the rings to be sandwiched between selected coil layers. Both sandwiching arrangements of short-circuit rings are missing from McLoughlin and Lungu. Thus, claims 22 and 23 further distinguish over McLoughlin and Lungu in a manner similar to claims 19 and 20.

Claims 25 and 26 depend on claim 24, which depends on claim 18. Claim 24 calls for the coil layers of each coil to be cylinder-type coil layers. Claim 25 calls for the short-circuit rings to be sandwiched between each of the coil layers, and claim 26 calls for the short-circuit rings to be sandwiched between selected coil layers. Cylinder-type coil layers are shown in Fig. 4 and described on page 19, paragraph 32. The insertion of the short-circuit rings into selected inter-coil-layer spaces is disclosed in original claim 5 as it depended from claim 3.

It is believed that a fee of $160.00 is due for this submission. Therefore, if any additional fees are necessary in the filing of this Appeal Brief, please charge such fees to our Deposit Account No. 22-0261.

It is respectfully requested that the rejection of the Examiner not be sustained.

Respectfully submitted,

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IX. APPENDIX

18. An isolation transformer comprising:

a multi-layer, multi-winding primary coil fabricated by stacking coil layers formed by winding an insulated, covered, copper wire;

a multi-layer, multi-winding secondary coil fabricated by stacking coil layers formed by winding an insulated, covered copper wire;

a core that forms a magnetic path between the primary coil and the secondary coil; and

a plurality of short-circuit rings made of conducting thin films sandwiched between the coil layers of at least one of the primary and secondary coils.

19. The isolation transformer of claim 18, wherein the short-circuit rings are sandwiched between each of the coil layers.

20. The isolation transformer of claim 18, wherein the short-circuit rings are sandwiched between selected coil layers.

21. The isolation transformer of claim 18, wherein the coil layers of the primary and the secondary coils are sheet-type coil layers and are formed by winding the copper wire spirally.

22. The isolation transformer of claim 21, wherein the short-circuit rings are sandwiched between each of the coil layers.

23. The isolation transformer of claim 21, wherein the short-circuit rings are sandwiched between selected coil layers.

24. The isolation transformer of claim 18, wherein the coil layers of the primary and the secondary coils are cylinder-type coil layers and are formed by winding the copper wire cylindrically.

25. The isolation transformer of claim 24, wherein the short-circuit rings are sandwiched between each of the coil layers.

26. The isolation transformer of claim 24, wherein the short-circuit rings are sandwiched between selected coil layers.

27. An isolation transformer, comprising:

a multi-layer, multi-winding primary coil fabricated by stacking coil layers formed by winding an insulated, covered copper wire;

a multi-layer, multi-winding secondary coil fabricated by stacking coil layers formed by winding an insulated, covered copper wire;

a core forming a magnetic path between the primary coil and the secondary coil; and

at least one short-circuit ring formed by coating the copper wire of at least one of the primary and secondary coils with a thin conducting film.